

In the Claims

Claims 1-9 (canceled)

Claim 10 (new) A process for the production of unsaturated hydrocarbons, with the following layout:

- In a first step hydrocarbon, which may have a water vapor content but which is essentially free from oxygen, penetrates in a continuous stream through a first catalyst bed, the latter exhibiting the standard dehydration conditions;
- subsequently the reaction mixture obtained in the first step is mixed with liquid phase water and water vapor as well as with an oxygen-bearing gas;
- and then the reaction mixture is fed in a continuous stream to a further catalyst bed as second step in which hydrogen oxidation and further dehydration of the hydrocarbons take place.

Claim 11 (new) The process according to claim 10, wherein the first catalyst bed is heated and the heating of the first step is preferably adjusted in such a manner that an essentially isothermal operating mode is obtained.

Claim 12 (new) The process according to claim 10, wherein oxygen-bearing gas is added to the reaction mixture produced in the second step and the reaction mixture thus obtained flows in a continuous stream through a further catalyst bed in at least a third step.

Claim 13 (new) The process according to claim 10, wherein the reaction mixture is cooled in a cooling unit downstream of the second step prior to entering a further catalyst bed in a third process step.

Claim 14 (new) The process according to claim 10, wherein the catalyst bed of the first step uses any standard commercial dehydration catalyst and the second and any further catalyst bed are provided with dehydration catalysts that exhibit not only dehydration activity but also SHC activity.

Claim 15 (new) The process according to claim 11, comprising a catalyst that contains Pt and Sn applied to a carrier element essentially containing aluminate.

Claim 16 (new) The process according to claim 11, comprising a specialist catalyst for water oxidation, hence a catalyst that improves the selectivity compared to that of standard dehydration catalysts when it comes to hydrogen oxidation, the said specialist catalysts being employed in combination with standard dehydration catalysts.

Claim 17 (new) The process according to claim 10, wherein the oxygen-bearing gas is oxygen-rich air.

Claim 18 (new) The process according to claim 10, wherein the quantity of oxygen-bearing gas added in the second and further steps is controlled via the temperature measured at the outlet of the respective upstream catalyst bed or via the outlet temperature of the last catalyst bed.

Claim 19 (new) The process according to claim 10, wherein the hydrocarbon comprises a mixture containing alkanes.

Claim 20 (new) The process according to claim 15, wherein the aluminate comprises zinc aluminate.